

CLAIMS

The invention claimed is:

1. A WDM layer-based OChP (Optical Channel Protection) device capable of signal transmission on working channels and routing selection for protection channels between the transferred traffic and the WDM system, comprising
5 a transmitting module and
a receiving module;
the transmitting module and the receiving module each comprising
N working channels connected to receiving ends and to transmitting ends of N
10 working channels of the WDM system respectively,
M protection channels connected to receiving ends and to transmitting ends of M
protection channels in the WDM system respectively; and
a switching device designed to switch signals in the working channels to the
protection channels and to switch signals in the protection channels to the working channels
15 according to switching requests from the WDM system; wherein M and N are natural
numbers and $M < N$.
2. The WDM layer-based OChP device according to Claim 1, wherein M is greater than 1.

3. The WDM layer-based OChP device according to Claim 1, wherein the switching device of the transmitting module comprises

N 50:50 couplers and

an N×M optical switch; one of the two output ports of each coupler being

5 connected to a working channel in the WDM system, the other of the two output ports

being connected to an input port of the N×M optical switch; M output ports of the N×M

optical switch being connected to the M protection channels of the WDM system

respectively;

and wherein the switching device of the receiving module comprises

10 N 50:50 couplers and

an M×N optical switch, one of the two input ports of each coupler being connected

to a working channel in the WDM system, and the other of the two input ports being

connected to an output port of the M×N optical switch; M input ports of the M×N optical

switch being connected to the M protection channels of the WDM system respectively.

- 15 4. The WDM layer-based OChP device according to Claim 1, wherein the switching device of the transmitting module comprises

N 1×2 optical switches and

an N×M optical switch, one of the two output ports of each 1×2 optical switch being

connected to a working channel in the WDM system, the other of the two output ports being

connected to an input port of the $N \times M$ optical switch; M output ports of the $N \times M$ optical switch being connected to the M protection channels of the WDM system respectively;

and wherein the switching device of the receiving module comprises

N 1×2 optical switches and

5 an $M \times N$ optical switch, one of the two input ports of each 1×2 optical switch being connected to a working channel in the WDM system, the other of the two input ports being connected to an output port of the $M \times N$ optical switch, and M input ports of the $M \times N$ optical switch being connected to the M protection channels of the WDM system respectively.

5. The WDM layer-based OChP device according to Claim 1, wherein said switching device
10 of said transmitting module comprises

 an $N \times (N+M)$ optical switch, the $N+M$ output ports of the $N \times (N+M)$ optical switch being connected to the N working channels and the M protection channels of the WDM system respectively;

 and wherein the switching device of the receiving module comprises

15 an $(N+M) \times N$ optical switch, the $N+M$ input ports of the $(N+M) \times N$ optical switch being connected to the N working channels and the M protection channels of the WDM system respectively.

6. A WDM layer-based OChP method capable of signal transmission through working channels and routing selection for protection channels between the transferred traffic and the WDM system comprising the following steps:

monitoring by the WDM system of quality of signals in each channel and routing

state of OChP modules in the system in real time;

determining by the WDM system whether some signals in the working channels are to be switched to the protection channels; and if they are, selecting the protection channels the WDM system ;

sending by the WDM system of accurate switching requests to the OChP

transmitting module and the OChP receiving module;

performing by the OChP transmitting module and the OChP receiving module of switching according to the switching requests from the WDM system;

wherein the WDM system comprises N working channels and M protection channels, M and N being natural numbers, M being less than N.

7. The WDM layer-based OChP method according to Claim 6, wherein M is greater than 1.
8. The WDM layer-based OChP method according to Claim 6, further comprising
- determining by the WDM system whether come signals transmitted in the protection channels are to be switched back to the working channels, and if they are,

determining the working channel to receive the signals, and sending accurate switching requests to the OChP transmitting module and the OChP receiving module simultaneously.

9. The WDM layer-based OChP method according to Claim 6, wherein when no signals are switched to the protection channels, the protection channels carry traffic with low priority.